EPA Region 7 TMDL Review

TMDL ID	5	*Water Body ID*	IA 01-MAQ-0010-0
Water Body Name	Rock Creek		
Pollutant	Ammonia and Nox (Nitrates and Nitrites)		
Tributary	Unclassified - known as Ammonia Creek		
State	IA *HUC*	1107080101030	
Basin	Copperas-Duck		
Submittal Date	12/28/2000		
Approved	yes		

Submittal Letter

State submittal letter indicates final TMDL(s) for specific pollutant(s)/ water(s) were adopted by the state, and submitted to EPA for approval under section 303(d) of the Clean Water Act.

Letter to EPA formally submitting this TMDL dated December 28, 2000, received December 28, 2000, via fax.

Water Quality Standards Attainment

The water body's loading capacity for the applicable pollutant is identified and the rationale for the method used to establish the cause-and-effect relationship between the numeric target and the identified pollutant sources is described. TMDL and associated allocations are set at levels adequate to result in attainment of applicable water quality standards.

Iowa's WQS for ammonia is pH and temperature dependent. The equation used to determine the specific ammonia criteria based on pH and temperature is found in Iowa's 1996 WQS; Chapter 61, Table 3c. Iowa's WQS for Nox is a narrative statement: "waters shall be free from substances…which are acutely toxic to humans, animals, or plant life." The Nox TMDL is bundled within the ammonia TMDL. It is believed that reductions in ammonia available to oxidize will reduce the concentration of Nox to a level which will not violate the narrative criterion for Nox.

Numeric Target(s)

Submittal describes applicable water quality standards, including beneficial uses, applicable numeric and/or narrative criteria. If the TMDL is based on a target other than a numeric water quality criterion, then a numeric expression, site specific if possible, was developed from a narrative criterion and a description of the process used to derive the target is included in the submittal.

All designated beneficial uses are described as well as the numeric target for ammonia and a discussion of the narrative WQS for nitrate/nitrite (NOx). This TMDL was identified as high priority. The chronic ammonia criterion of 1.84 mg/L, based on a pH of 8.2 and a temperature of 23.8 degrees C, is identified as the target. This TMDL will be completed in 2 phases (see monitoring comments); in Phase 1 the chronic criterion will be achieved at the overflow from the downstream wetland complex. Under Phase 2, the chronic criterion will be achieved after mixing of Ammonia Creek and Rock Creek. Complete mixing with Rock Creek is expected to occur within 200 feet downstream of the confluence of Ammonia Creek and is in compliance with the Iowa WQS mixing zones regulations.

Link Between Numeric Target(s) and Pollutant(s) of concern

An explanation and analytical basis for expressing the TMDL through surrogate measures (e.g., parameters such as percent fines and turbidity for sediment impairments, or chlorophyll-a and phosphorus loadings for excess algae) is provided, if applicable. For each identified pollutant, the submittal describes analytical basis for conclusions, allocations and margin of safety that do not exceed the load capacity.

The Iowa WQS for the chronic ammonia criterion is used. In the case of NOx, the pollutant(s) are bundled within the ammonia TMDL because the pollutants are so closely related. In the nitrification process, ammonia is oxidized and broken down to nitrite and then to nitrate. There is a statistical relationship between the increase in NOx and the increase in ammonia around the PCS Nitrogen facility. By limiting the amount of ammonia that can complete the nitrification cycle, the amount of nitrites and nitrates will also be limited and therefore reduced.

Source Analysis

Important assumptions made in developing the TMDL, such as assumed distribution of land use in the watershed, population characteristics, wildlife resources, and other relevant information affecting the characterization of the pollutant of concern and its allocation to sources, are described. Point, non point and background sources of pollutants of concern are described, including magnitude and location of the sources. Submittal demonstrates all significant sources have been considered.

There are four NPDES permitted discharges in the watershed, but just one, the City of Low Moor, discharges into Rock Creek. The other 3 facilities discharge into the Mississippi River but are considered contaminated sites that that have the potential to contribute pollutants to Rock Creek through groundwater contamination. Two of these facilities, Equistar and DuPont, are considered Superfund sites, however, both are believed to have an insignificant possibility of contributing nitrogen compounds to Rock Creek. Agricultural is the predominate land use in the watershed, but it is believed to be a minimal source of ammonia and NOx. Continued monitoring during phase one of this TMDL of agricultural land and drain tiles will determine if there is a significant impact from agriculture runoff and will allow a more accurate identification of background sources. The predominate source of nitrogen compounds in the watershed is contaminated groundwater located under the

PCS Nitrogen facility. This groundwater is discharged to Ammonia Creek which then flows into Rock Creek. Based on long-term research monitoring data, it is estimated that 96 pounds of ammonia is discharged into Ammonia Creek every day impacting Rock Creek.

Allocation

Submittal identifies appropriate wasteload allocations for point, and load allocations for nonpoint sources. If no point sources are present the wasteload allocation is zero. If no nonpoint sources are present, the load allocation is zero.

The TMDL describes that the allocation for Rock Creek will account for the impacts of historical spills to the lands adjacent to PCS Nitrogen and the influence of agricultural drain tiles and other diverse sources. The estimated LA for NOx and ammonia was developed from Long-Term Resource Management Plan (LTRMP) monitoring data. The estimated WLA was developed from monitoring data collected very near the mouth of Ammonia Creek and the loadings from Ammonia Creek (and the PCS Nitrogen site) are considered the generalized point source. Although the sources of ammonia and NOx from the site may be localized surface and groundwater contributions, the impact to Rock Creek is considered similar to that of a point source loading. The loading capacity for ammonia is 5 pounds/day; the loading capacity for NOx is 30 pounds/day.

WLA Comment

The WLA's for ammonia and NOx were calculated using the critical stream flow. The WLA for ammonia is 4.8 pounds/day; the WLA for NOx is 14.6 pounds/day.

LA Comment

The LA for ammonia is 0.2 pounds/day; the LA for NOx is 15.4 pounds/day.

Margin of Safety

Submittal describes explicit and/or implicit margin of safety for each pollutant. If the MOS is implicit, the conservative assumptions in the analysis for the MOS are described. If the MOS is explicit, the loadings set aside for the MOS are identified and a rationale for selecting the value for the MOS is provided.

The MOS is identified as implicit due to the use of a higher temperature (using a statewide average) in the derivation of the chronic ammonia criterion than typically has been documented at two monitoring stations located in the Rock Creek watershed, and using a lower critical flow (0.5 cfs) than the 7Q10 (7Q10 flow = 0.9 cfs) which occurs at the mouth of Rock Creek, in the calculation of loadings. The critical flow of 0.5cfs was calculated at the headwaters of Rock Creek. The assumption is that the corresponding low flow in Rock Creek at the confluence with Ammonia Creek, approximately four miles downstream, is substantially greater than the 0.5 cfs protected flow at the head waters, resulting in the additional implicit MOS.

Seasonal Variation and Critical Conditions

Submittal describes the method for accounting for seasonal variation and critical conditions in the TMDL(s).

Seasonality and critical conditions are addressed and it was determined based on long-term monitoring data that the highest in-stream ammonia and nitrate concentrations occur during the summer when low-flow conditions typically occur. However, with the collection of further monitoring data during Phase 1 of this TMDL, the potential for other critical conditions, seasonal ammonia nitrogen endpoints using seasonal pH and temperature values and alternative stream flow regimes will be calculated.

Public Participation

Submital describes public notice and public comment opportunity, and explains how the public comments were considered in the final TMDL(s).

A public meeting was held in Camanche on March 7, 2000 regarding this TMDL. A second public meeting was held November 16, 2000 regarding the Rock Creek watershed and public comments were accepted for thirty days closing December 15, 2000. Those public comments, where appropriate, were incorporated into the final TMDL.

Monitoring Plan for TMDL(s) Under Phased Approach

The TMDL identifies the monitoring plan that describes the additional data to be collected to determine if the load reductions required by the TMDL lead to attainment of WQS, and a schedule for considering revisions to the TMDL(s) (where phased approach is used).

Three practices have been installed in the watershed to reduce the amount of ammonia flowing into Rock Creek. Those practices are: a constructed wetland on Rock Creek downstream of the confluence with Ammonia Creek, the planting of hybrid Poplar trees along Ammonia Creek that take up excess amounts of nitrogen, and a diversion trench that removes the top ten feet of groundwater. The diverted groundwater is held in the facilities treatment lagoon and then discharged into the Mississippi River under the facilities existing NPDES permit. Under Phase 1 of this TMDL, an assessment of the Rock Creek water quality will begin in 2001. This assessment will determine the current nitrogen loading (ammonia, nitrite, and nitrate) to Rock Creek from the entire watershed. The assessment will also help determine the impact of the PCS Nitrogen site on the water quality in Rock Creek, and the effectiveness of the wetland at assimilating nitrogen compounds. This monitoring will continue for two to four years. After the monitoring is complete, the level of impairment will be reassessed. Following Phase 1 assessment, it will be determined if the ammonia endpoint has been achieved at the discharge of the wetland complex, then additional control measures will be implemented to achieve the Phase 1 endpoint. Following achievement of the endpoint at the wetland complex discharge, Phase 2 will be initiated. It is expected that Phase 2 will begin three to five years following adoption of this TMDL.

Reasonable assurance

Reasonable assurance only applies when reduction in nonpoint source loading is required to meet the prescribed waste load allocations.